

REMARKS

In the present Amendment, Claim 10 has been amended to recite a Markush group for item (E) an organic alkali metal compound as a polymerization initiator. Section 112 support for this amendment is found, for example, in paragraph [0048] at page 11 of the specification. New Claim 19 has been added. Section 112 support for Claim 19 is found, for example, in paragraph [0050] at page 11 of the specification. No new matter has been added, and entry of the Amendment is respectfully requested.

Upon entry of the Amendment, Claims 1-19 will be pending.

As an initial matter, the Examiner is respectfully requested to acknowledge Applicants' claim for foreign priority and to confirm that the certified copy of the priority document has been received.

In paragraph No. 3 of the Action, Claims 1-18 have been rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as allegedly being unpatentable over Favrot et al (US 6,624,267).

Applicants submit that this rejection should be withdrawn because Favrot et al does not disclose or render obvious the presently claimed rubber composition or tire.

Present Claim 1 relates to a rubber composition using a modified conjugated diene polymer, characterized by comprising

(A) 100 parts by mass of a rubber component containing not less than 10% by mass of a conjugated diene polymer having a polymer chain with at least one functional group selected from the group consisting of a substituted amino group represented by formula (I) and a cyclic amino group represented by formula (II);

(B) not less than 20 parts by mass of carbon black; and

(C) not more than 1.0 part by mass of a polycyclic aromatic compound (PCA).

As disclosed in paragraph [0067] at page 14 of the specification, PCA acts as a radical trapping agent in the milling of the rubber composition and masks the active site of the functional group to thereby damage the effect of improving the dispersion. In the present invention, it has been discovered that not only the dispersibility but also the $\tan \delta$ reducing effect (low heat buildup) in the rubber composition can be attained by using the modified polymer defined in Claim 1 and restricting the amount of PCA used to not more than 1.0 part by mass.

Comparative Examples 4-7 in Table 3 at page 21 of the specification contain 2.1 parts by mass of PCA (10 parts by weight of the softening agent A) in rubber compositions, it is shown that the effect of lowering $\tan \delta$ (low heat buildup) is faded by the addition of 2.1 parts of PCA. See, paragraph [0093] at page 22 of the specification.

In contrast, when the PCA content is less than 1.0 part by mass, the effect of lowering $\tan \delta$ (low heat buildup) is substantially equal. See, Tables 4 at page 22, Table 5 and paragraph [0096] at page 23 of the specification.

Favrot et al do not disclose the use of PCA and the $\tan \delta$ reducing effect developed by using not more than 1.0 parts by mass of PCA.

Further, in the modified polymer of Favrot et al, the trans content is not less than 70% (Claim 1). On the contrary, according to the present invention, as seen from Claims 3, 4 and 10, the trans content of the conjugated diene-based polymer never exceeds 60%. Further, when a chelating agent as recited in Claim 19 is added to the mixture of components (D) and (E), the vinyl content increases and hence the trans content further decreases.

In the polymer produced by using the organic alkali metal compound defined in Claim 10 as amended, the trans content is not more than 60% as described in Anionic Polymerization Principles and Practical Applications, page 398, Figure 15.1, a copy of which is attached hereto.

Therefore, the present invention is entirely different from that of Favrot et al and can not easily be conceived therefrom.

In view of the above, reconsideration and withdrawal of the rejection based on Favrot et al are respectfully requested.

Allowance is respectfully requested. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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Figure 15.3. The overall heat activation energy leading to 1,2 addition is greater than that leading to 1,4 addition [15,18]. Initiator structure (i.e., organic moiety of the initiator), monomer concentration, and conversion have essentially no effect on polymer microstructure.

II. POLYDIENES

Firestone and Shell started commercial production of *cis*-polyisoprene by the anionic process in the 1950s, but these plants are no longer in operation. Firestone technology employed lithium metal, while Shell used alkylaluminum initiator. The anionic produced polyisoprene rubber has 92–94% *cis* and is linear, very high molecular weight, with narrow molecular weight distribution, and is free from traces of transition metals, which could be troublesome in certain applications. The other technology using trialkylaluminum/titanium tetrachloride and initiator produces polyisoprene rubber of 96–98% *cis* and is virtually indistinguishable from natural rubber by infrared spectroscopy, ensuring more rapid crystallization and hence higher tear strength in vulcanizates, which are close in mechanical properties to those from natural rubber [19–21]. About the same time, Phillips started manufacturing polybutadienes by the anionic route and ever since their use

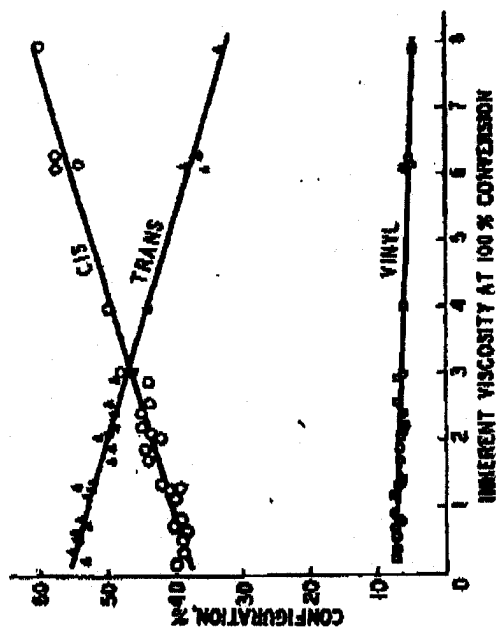
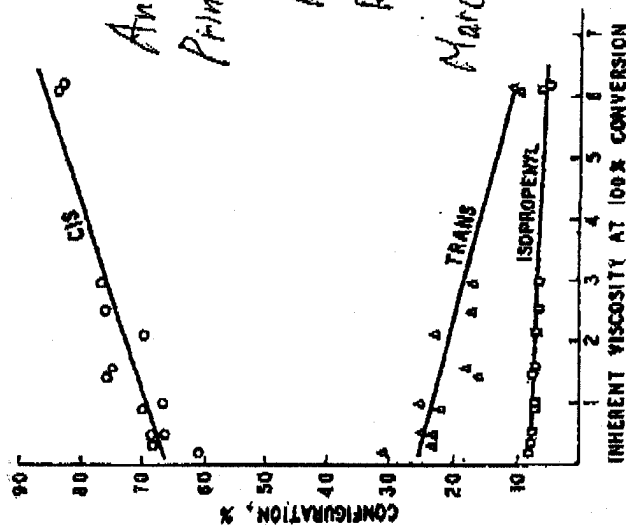


Figure 15.1 Microstructure of polybutadiene initiated with alkylaluminum in cyclohexane at 50°C. (From Ref. 17, 18 used with permission from John Wiley & Sons.)



*Anionic Polymerization
Principles and Practical Applications*

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